भारतीय मानक
Indian Standard

IS 10464 : 2023

वैगन पुलर/पुशर चयन के लिए आंकड़ापत्र

(पहला पुनरीक्षण)

Data Sheet for Selection of Wagon Puller/Pusher

(*First Revision*)

ICS 53.040

© BIS 2023

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

June 2023 **Price Group 7**

Earth Moving Equipment and Material Handling Sectional Committee, MED 07

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Earth Moving Equipment and Material Handling Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard will supersede IS 10464 : 1983.

About selection of wagon puller/pusher:

Raw materials like coal, ore, lime stone, etc, are supplied to steel plant, thermal power station and other similar industries through open railway wagons. The contents of the railway wagons are emptied at industrial units through the use of wagon tipplers. For optimum utilization of wagon tipplers, wagons are placed and removed from wagon tipplers with the use of marshalling equipment. Marshalling equipment namely. Beetle trolley type/ Continuous wire rope type are used for in hauling/out hauling of the wagons on unloading/ loading tracks as also for correct placement/spotting of wagons at the desired position.

The wagon marshalling equipment used in conjunction with wagon tipplers operates either in between the railway tracks or by the side of the tracks. With a view to minimize the damage to either the railway equipment or the marshalling equipment, it is desired that the marshalling equipment is designed and placed in a manner that it does not interfere with the normal operation of railway wagons or other equipment on the railway track. The Research Design and Standards Organization (Ministry of Railways), Lucknow, therefore, desires that all the wagons marshalling equipment when passing below or alongside the wagon shall be out of the limiting gauge profile of the wagon given in Fig. 1.

The composition of the committee responsible for the formulation of this standard is listed in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded-off value should be the same as that of the specified value in this standard.

Indian Standard

DATA SHEET FOR SELECTION OFWAGON PULLER/PUSHER

(First Revision)

1 SCOPE

This standard lays down the data required for the selection of wagon pullers/pushers.

2 DATA SHEET

2.1 Application and Site Data

a) Applicable to Proposal.................. Purchase............. As built.............. Date...........
b) Service............. Continuous/Intermittent; Days per year …................................ Days
c) Duty; Operating hours per shift.............................. h; Shifts per day..........................
d) Type……………………………...
e) Manufacturer…………………………………..
f) Site condition………………..
   1) Surroundings/Environmental Condition……………..
   2) Relative humidity (*Max*) at.................................°C ....Percent
   3) Temperature; *Max*............... °C; *Min*................... °C; Design........................... °C
   4) Rainfall; Average............................ mm; *Max* .... mm
   5) Wind velocity... kmph
   6) Siesmic coefficient.................................... Zone………..
   7) Area classification;... Hazardous/Non-Hazardous
g) Available power supply; Volts................; Phase................. Frequency.....................

2.2 Wagon Data

a) Type……...
b) Weight; Gross .... t; Tare .... t
c) Total gross weight of wagons to be handled….. t
d) Maximum distance of last wagon .... m
e) Maximum number of wagons in a rake……..

2.3 Track Data

a) Level ....; Incline ....; Degree of curvature……....................
b) Gauge…...

c) Size……………..

d) Gradient; Inhaul side...................................;Out haul side.......................................

e) Number and position of track switch points (enclose sketch)

………………………………………………………………….................................

2.4 Technical Specification

2.4.1 *General Data*

a) Number of wagons pulled...…......

b) Related tractive effort ……………………………………………........................... kg

c) Maximum permissible capacity (*Max* tractive effort)………................................... kg

d) Continuous/Beetle speed .... m/min

e) Range of working…...

f) Hitch rope length………………………………………………………………............

g) Pay in rope…………………………...

h) Enclosure: .... Totally enclosed/Partially enclosed/Not enclosed.

2.4.2 *Drive Data*

	Inhaul		*Outhaul*	
	Continuous Wire Rope Type	Beetle Charger Type	Continuous Wire Rope Type	Beetle Charger Type
a) Electric Motor				
Make	……………….	……………	………………	……………
Type	……………….	……………	………………	……………
Power	………….kW	……….kW	………….kW	……….kW
Speed	…………rpm	……….rpm	………….rpm	……….rpm
Class of Insulation	………………	……………	………………	……………
b) Coupling				
Type	……………….	…………….	……………….	..……………
Make	……………….	…………….	……………….	..……………
Size	……………….	…………….	……………….	…..…………

	Inhaul				*Outhaul*			
	Continuous Wire Rope Type		Beetle Charger Type		Continuous Wire Rope Type		Beetle Charger Type	
c) Primary/Secondary Reduction								
Type	…………..		…………..		……………..		……………..	
Ratio	…………..		…………..		……………..		……………..	
Make	…………..		…………..		……………..		……………..	
Size	…………..		…………..		……………..		……………..	
Lubrication	…………..		…………..		……………..		……………..	
Mass	…………kg		…………kg		………….kg		…………kg	
According to which specification	…………..		…………..		……………..		……………..	
d) Reduction Gear Box:								
Type	………………		……………		……………….		……………..	
Size	………………		……………		……………….		……………..	
Make	………………		……………		……………….		……………..	
Reduction ratio	………………		……………		……………….		……………..	
Service factor	………………		……………		……………….		……………..	
Efficiency	………………		……………		……………….		……………..	
Gears:	Pinion	Spur	Pinion	Spur	Pinion	Spur	Pinion	Spur
Tooth type	………	……	…….	……	…….	…….	…….	……
Pressure	………	……	…….	……	…….	…….	…….	……
Angle	………	……	…….	……	…….	…….	…….	……
Module	………	……	…….	……	…….	…….	…….	……
No. of teeth	………	…….	…….	……	…….	…….	…….	……
Width	………	……	…….	……	…….	…….	…….	……
Hardness	………	……	…….	……	…….	…….	…….	……
e) Brakes								
Type	………………..		……………..		……………...		……………	
Make	………………		……………		………………		……………	

Braking torque *Max*	……….............	……….........	………...........	……….......
Drum diameter	………………	……………	………………	……………

2.4.3 *Wire Ropes*

	Inhaul		*Outhaul*	
	Continuous Wire Rope Type	Beetle Charger Type	Continuous Wire Rope Type	Beetle Charger Type
a) Size	………… mm	……… mm	………… mm	…….. mm
b) Construction	……………	…………..	………………	…………
c) Ultimate breaking strength	…………….	…………	………………	…………
d) Factor of safety	…………….	…………..	………………	…………

2.4.4 *Drums and Sheaves*

	Inhaul		*Outhaul*	
	Continuous Wire Rope Type	Beetle Charger Type	Continuous Wire Rope Type	Beetle Charger Type
a)Type	………………	……………	…………………	……………
b) Size	……………mm	………..mm	…………… mm	……….. mm
c) Construction	………………..	……………..	………………..	……………..
d) Bearings	……………….	…………….	…………………….	…………….
e) Face width	……………….	…………….	…………………….	…………….
f) Rope drum diameter	…………… mm	…………mm	……………mm	………...mm
g) Construction of rope drum	……………….	…………….	…………………….	…………….

2.4.5 *Specific Data*

2.4.5.1 *General*

a) Type …………………………………Continuous wire rope type/Beetle trolley type.

b) Rated pushing pulling capacity ………………………………………...…………..t

c) Axle load ………………………………………………………………………….t

d) No. of wagons to be pushed at a time ………………………………………………….

e) Maximum permissible capacity …………………………………………………….t

f) Speed of travel ………………………………………………………………….. m/s
g) Inching speed …………………………………………………………………… m/s
h) Reversing speed ………………………………………………………………….m/s
j) Range of travel ……………………………………………………..…….m/s
k) Current collector; Type ……………Feed voltage ……………….. Type of insulation.

2.4.5.2 Continuous wire rope puller ………………………………Reversible/Non Reversible

a) Drum: Numbers …………………………..; Size…………………………….
b) Bearing: Type………………………..; Make and size…………………………
c) Hold back:………………………………….……………Required/Not required
    1) Type ………………………………………………………………………….
    2) Capacity and size …………………………………………………………….
d) Take up ………………………………………………………………………….
    1) Type …………………………………………………………………………..
    2) Weight ………………………………………………………………………..
    3) Movement/Travel………………………………………...…………….......
e) Over travel limit switch
    1) Type …………………………………………………………………………..
    2) Size ……………………………………………………………………………
    3) Particulars ……………………………………………………………………
f) Overall size ……………………………………………………………………
g) Weight, complete ………………………………………..…………………kg
h) Foundation bolts; Numbers and sizes ……………………………………..….
j) Manufacturer drawing number ……………………………………………………

2.4.5.3 *Beetle trolley type*

	Inhaul	*Outhaul*
a) Reversible/Non-reversible	……………………………….	……………………………….
b) Track:		
1) Gauge	…………………………mm	………………………..mm
2) Size	……………………….kg/m	……………………....kg/m
3) Length	………………………..mm	………………………..mm

c) Trolley:		
1) Type	……………………………	……………………………
2) Speed		
i) Forward	……………………………m/s	……………………………m/s
ii) Return	……………………………m/s	……………………………m/s
3) Total travel (stroke)	……………………………mm	……………………………mm
4) Height of roller or highest element from rail level during:		
i) Hauling position	……………………………..mm	……………………………..mm
ii) Retracting position	……………………………..mm	……………………………..mm
d) Pushing rollers:		
1) Numbers	……………………………..	……………………………..
2) Diameter	……………………………mm	……………………………mm
3) Bearings	……………………………..	……………………………..
4) Lubrication	……………………………..	……………………………..
5) Hardness	……………………………..	……………………………..
e) Winch drums:		
1) Numbers	……………………………...	……………………………...
2) Size	……………………………...	……………………………...
f) Rollers pushing mechanism data:		
1) Pinion	……………………………..	…………………………….
2) Section gear	……………………………..	…………………………….
3) Locking	……………………………..	……………………………...
g) Bearings:		
1) Type	……………………………	……………………………..
2) Make	……………………………	……………………………..
3) Size	……………………………	……………………………..
h) Overall size:		
1) Beetle	……………………………..	……………………………..
2) Mass	……………………………kg	……………………………kg

3) Winch haul drive	…………………………….	…………………………….
4) Mass of complete drive unit	………………………..…kg	…………………………kg
j) Track limit switch		
1) Type	…………………………….	……………………………..
2) Size	…………………………….	……………………………..
k) Limit switch for drive		
1) Type	……………………………	…………………………….
2) Chain	……………………………	…………………………….
i) Type	……………………………	…………………………….
ii) Size	…………………………….	…………………………….
iii) Make	……………………………	…………………………….
3) Chain Sprocket		
i) Number of teeth	…………………………….	…………………………….
ii) Pitch	…………………………….	…………………………….
iii) Hardness	…………………………….	…………………………….
m) Take-up		
1) Type	……………………………	…………………………….
2) Travel	……………………………	…………………………….
n) Foundation bolts		
1) Number	…………………………..	…………………………….
2) Size	…………………………..	…………………………….
p) Manufacturer’s drawing No.	……………………………	…………………………….

2.5 Materials of Construction

a) Beetle trolley: 1) Frame: Inhaul side …………….; Outhaul side…………….
2) Rollers: ……………………………………………………….
3) Drawbar ………………………………………………………
4) Arms ………………………………………………………….
b) Drum: Continuous wire rope type ……………………………………………..
Beetle charger type ……………………………………………………………
c) Gears:
1) Wagon pusher …………………………………………………………………..

2) Continuous wire rope type …………………………………………………………
3) Beetle charger type ……………………………………………………………………

d) Wire rope:
1) Continuous wire rope type ……………………………………………………….
2) Beetle charger type ………………………………………………………………….

e) Thimble ……………………………………………………………………………..

f) Sheaves ………………………………………………………………………………

g) Hook/Pushing rollers …………………………………………………………..

h) Basket ……………………………………………………………………………….

j) Wedge ……………………………………………………………………………….

2.6 Scope of Supply:……………………………………………………………………….

……………………………………………………………………………………………..…

…………………………………………………………………………………………………

………..…………………………………………………………………..................................

2.7 Exclusions: ……………………………………………………………………......

…………………………………………………………………………………………………

………………………………………………………………………………………………

……………………………………………………………………………………………..

2.8 Remarks: ……………………………………………………………………………..

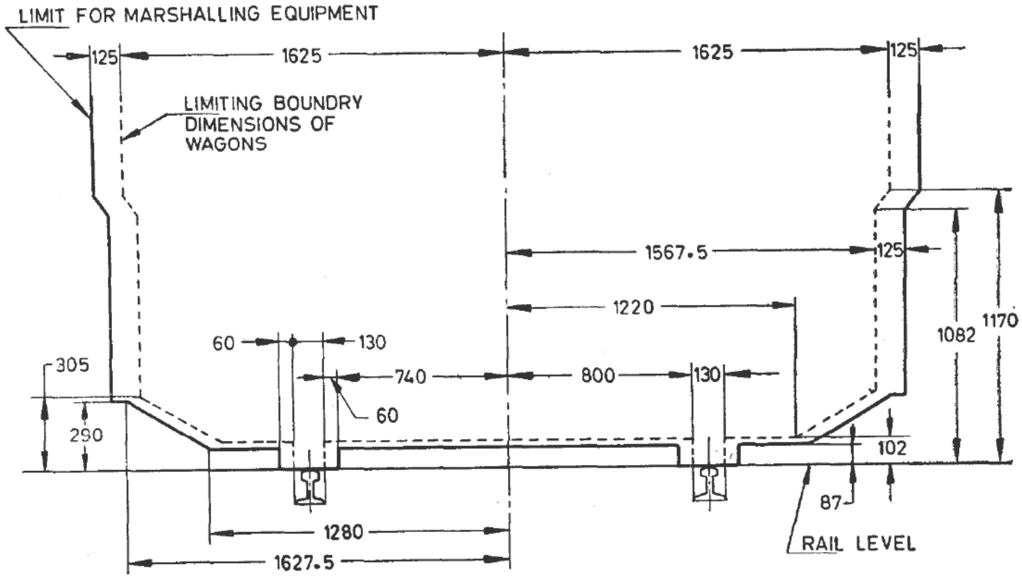
…………………………………………………………………………………………………

………..…………………………………………………………………………………………

EXPLANATORY NOTE

Raw materials like coal, ore, lime stone, etc., are supplied to steel plant, thermal power station and other similar industries through open railway wagons. The contents of the railway wagons are emptied at industrial units through the use of wagon tipplers. For optimum utilization of wagon tipplers, wagons are placed and removed from wagon tipplers with the use of marshalling equipment. Marshalling equipment namely beetle trolley type/Continuous wire rope type are used for inhauling/outhauling of the wagons on unloading/loading tracks as also for correct placement/ spotting of wagons at the desired position.

The wagon marshalling equipment used in conjunction with wagon tipplers operates either in between the railway tracks or by the side of the tracks. With a view to minimize the damage to either the railway equipment or the marshalling equipment, it is desired that the marshalling equipment is designed and placed in a manner that it does not interfere with the normal operation of railway wagons or other equipment on the railway track. The Research Design and Standards Organization (Ministry of Railways), Lucknow, therefore, desires that all the wagons marshalling equipment when passing below or alongside the wagon shall be out of the limiting gauge profile of the wagon given in Fig. 1.



All dimensions in millimetres.

FIG. 1 LIMITING DIMENSIONS

This standard lays down the data required for selection of wagon puller/pusher (wagon marshalling equipment). This data sheet may be utilized by manufacturers and purchasers alike to enable them to select the equipment according to their requirements.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Earth Moving Equipment and Material Handling Sectional Committee MED 07

Organization	*Representative(s)*
BEML Limited, Bengaluru	SHRI V. SEKAR (***Chairperson***)
Airports Authority of India, New Delhi	SHRI K. S. KUNWAR SHRI JASPAL SINGH (*Alternate*)
Automotive Research Association of India, Pune	SHRI A. AKBAR BADUSHA
BEML Limited, Bengaluru	SHRI HEMANT KUMAR (*Alternate*)
Bharat Coking Coal Limited, Dhanbad	SHRI ARUN NAND SAHAY SHRI CHANDRA SHEKHAR S. I. (*Alternate*)
Bharat Heavy Electrical Limited, New Delhi	SHRI G. BHAGCHANDANI SHRI S. K. BHAUMIK (*Alternate*)
Caterpillar India Private Limited, Channai	SHRI K. REJI JOSE SHRI V. BHASKARAN (*Alternate*)
Cement Corporation of India Limited, New Delhi	SHRI A. K. SRIVASTAVA SHRI ANURAG KUMAR SAINI (*Alternate*)
Central Mine Planning and Design Institute Limited, Ranchi	SHRI PARAG MAJUMDAR SHRI PRAVEEN K. SINHA (*Alternate*)
Directorate General Factory Advice Service and Labour Institutes, Mumbai	SHRI SUMIT ROY
Directorate General of Mines Safety, Dhanbad	SHRI D. B. NAYAK SHRI VIJAY YADAORAO BARAPATRE (*Alternate*)
Directorate General of Quality Assurance, Ministry of Defense, New Delhi	LT COL SIDHARTH KHATTRI SHRI RAGHUBIR SINGH (*Alternate*)
Engineers India Limited, New Delhi	SHRI K. C. PAIKAR SHRI R. R. SHRIVASTAVA (*Alternate*)
Epiroc Mining India Limited, Nashik	SHRI PRAKASH GORE

Organization	*Representative(s)*
Escorts Construction Equipment Limited, Faridabad	Shri Faiz Ahmad Ms Rupali Sharma
Fact Engineering and Design Organization, New Delhi	Shri R. K. Pallai Shri Juby Chandy (*Alternate*)
Heavy Engineering Corporation Limited, Ranchi	Shri Aravind Doss Shri Amit Pal (*Alternate* I) Shri Vijay Kumar (*Alternate* II)
Indian Construction Equipment Manufacturers Association, New Delhi	Shri K. V. Krishnamurthy
Indian Institute of Technology (ISM), Dhanbad	prof L. A. Kumaraswamidhas
JCB India Limited, New Delhi	Shri Saurabh Dalela Shri Vivek Rawat (*Alternate*)
John Deere India Private Limited, Mumbai	Shri Karthik Kaliappan Shri Raj Anand (*Alternate*)
Komatsu India Private Limited, Bengaluru	Shri M. Rajendran Shri Vikrant Sharma (*Alternate*)
L & T Komatsu Limited	Shri G. S. Narayana Shri K. Keshava (*Alternate*)
Mahindra Construction Equipment, Chakan	Shri Gopalkrishna Rajendra
Manitou India Limited, Greater Noida	Shri Atul K. Singhal
Mcnally Bharat Engineering Company Limited, Kolkata	Shri Ashok Kumar Bose Shri Sandipan Daw (*Alternate*)
Ministry of Heavy Industries and Public Enterprises, Department of Heavy Industry, New Delhi	Shri Sushil Lakra
Ministry of Shipping, New Delhi	Shri Anil Pruthi Shri Ramji Singh (*Alternate*)
Mumbai Port Trust, Mumbai	Shri Dilipvishwanathan Shri Pandian Sekar (*Alternate*)

Organization	*Representative(s)*
National Council for Cement and building Materials, Faridabad	SHRI KAPIL KUKREJA
	SHRI SAURABH BHATNAGAR (*Alternate*)
National Mineral Development Corporation, Hyderabad	SHRI S. J. RAO
	SHRI S. K. ROY (*Alternate*)
NTPC Limited, New Delhi	SHRI MADHUKAR ANAND
	SHRI P. S. CHATTERJEE (*Alternate*)
Office of Development Commissioner (MSME), New Delhi	SHRI SUSANTA KUMAR SOM
	SHRI SUVANKAR SANTRA (*Alternate*)
Project and Development India Limited, Noida	SHRI NARENDRA SINGH
	SHRI ABHIJIT MAHATA (*Alternate*)
Volvo Construction Equipments India Private Limited, Bengaluru	SHRI SAI PRASAD POLIPALLI
	SHRI K. RAGHURAMAN (*Alternate*)
In Personal Capacity (*165, 2nd Main Road, 4th Cross, Chamarajpet, Bengaluru-560018*)	SHRI G. NAGARAJ VENKATESH
BIS Directorate General	SHRI RAJNEESH KHOSLA, SCIENTIST 'F'/ SENIOR DIRECTOR AND HEAD (MECHANICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
MS KHASHBOO KUMARI
SCIENTIST 'D'/ JOINT DIRECTOR
(MECHANICAL ENGINEERING), BIS

This Page has been Intentionally left blank

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: MED 07 (17617).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi